

MTH6113 Assessment 2 – Deadline April 9th at 5PM.

Please submit two files on QMPlus – one excel and one pdf with the explanations for question 1 and solutions for question 2 and question 3.

- Using the same stocks from Assessment 1, plot their returns and their prices. For each stock use their empirical means and standard deviations to simulate their corresponding lognormal models. Explain your results. What are the drawbacks of the lognormal model for stock prices, based on your data.

[50 marks]

- In a market in which the Arbitrage Pricing Theory (APT) model holds, the expected return is given by

$$E[R_i] = \lambda_0 + \beta_{i,1}\lambda_1 + \beta_{i,2}\lambda_2 + \dots + \beta_{i,n}\lambda_n$$

- Assume that risk-free rate in this economy is 0.02. Consider a two-factor model, $n = 2$ and two well diversified portfolios P_1 and P_2 with the following features:

	P_1	P_2
Expected returns: $E(R_i)$	0.18	0.05
Sensitivity to factor 1: $\beta_{i,1}$	0.2	0.1
Sensitivity to factor 2: $\beta_{i,2}$	0.7	0.3

Find the risk premiums for each factor.

[15 marks]

- Assume there is another well diversified security P_3 in this economy with factor sensitivities, $\beta_{3,1} = 0.2$, and $\beta_{3,2} = 0.7$. The expected return of this security is $E(R_3) = 0.25$. State whether the APT is satisfied. If yes, explain why, if not propose an arbitrage strategy.

[15 marks]

- As a result of the COVID-19 crisis there was a global move to home working, and increased reliance on video conference facilities such as those offered by Zoom Video Communications. At the same time there was a sudden increase in trading volumes for Zoom Technology shares. The latter is a company that sells electronic technology for mobile phones. It was soon established that this was a clear case of mistaken identity. Please propose and explain a test for establishing whether the markets are efficient in this case.

[20 marks]